

Date: Wednesday, 18/06/2008 8:59:11 AM
 User: Julie Lecocq

Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services		Drawing Name	: HIGH AFT X-TUBE 412		
Job Number	: 39908		Part Number	: D412664203		
Estimate Number	: 10559		Drawing Number	: D412-664-243 REV D		
P.O. Number	:		Project Number	: N/A		
This Issue	18/06/2008	S.O. No. :	Drawing Revision	: D		
Prsht Rev.	: NC		Material	:		
First Issue	1 /	Type : CROSSTUBES	Due Date	27/06/2008	Qty:	1 Um: Each
Previous Run	: 39907					
Written By	:					
Checked & Approved By	: JUL 08.10.18					
Comment	Est Rev:E 04.02.16 Reformat; Added D3189-1 K/DS Est Rev:F 06-03-29 Remove Coments on Pick List JLM Est Rev:G 06.12.08 per ECN 886 EC Est Rev:H 07-04-30 As per Rev D JLM Est Rev:I 08-06-12 add comment in seq. 21 DD verified by:EC					

SCR AP

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
1.0	DC	DOCUMENT CONTROL  Comment: DOCUMENT CONTROL Photocopy bluefile and create labels as per PPP D412-664-203 CHG 006
2.0	PACKAGING 1	PACKAGING RESOURCE #1  Comment: PACKAGING RESOURCE #1
3.0	D412664203TRN	Crosstube Turning Detail  Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s) CROSSTUBE TURNING DETAIL batch <u>B40119</u> <i>EC 8-7-3</i>
4.0	BENDING	BENDING MACHINE - SKIDTUBES  Comment: BENDING MACHINE Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010 <i>EC 8-7-3</i>
5.0	QC15	DIMENSIONAL CHECK OF X-TUBES  Comment: DIMENSIONAL CHECK OF X-TUBES

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

642

Part No: D412-~~642~~-203 PAR #: N/A Fault Category: Prod/x-tube NCR: Yes No DQA: Date: 08/07/11
 QA: N/C Closed: _____ Date: _____

NCR: 39908		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
08.07.07	4	Xtube span after bending <107". R.C.: middle section was over bent, program is still in development.	08/07/09	Too NARROW, SCRAP TUBE 4/08.07.07 Gave to Eng Dept for Show etc.	08/07/10	08/04/10	08/07/09 1080710	

NOTE: Date & initial all entries

Date: Wednesday, 18/06/2008 8:59:12 AM
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1049
Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 39908

Part Number: D412664203

Job Number:



Seq. #:

Machine Or Operation:

Description :

6.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551

2-Ream hole to finish size in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243

7.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

8.0 QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

9.0 QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

10.0 OUTSIDE SERV.10

OUTSIDE SERVICES -skids



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: _____ LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

11.0 PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 39908

Part Number: D412664203

Job Number:



Seq. #:	Machine Or Operation:	Description :								
12.0	QC5	INSPECT WORK TO CURRENT STEP								
<p>Comment: Inspect for damage & ensure results are as per Dwg D412-664-203</p>										
13.0	SPRAY PAINTING	SPRAY PAINTING								
<p>Comment: SPRAY PAINTING</p> <p>1-Prime inside and outside crosstube as per QSI 005 4.2</p> <p>2-Paint outside crosstube with White Imron as per QSI 005 4.2</p>										
14.0	QC14	INSPECT SPRAY PAINT								
<p>Comment: Inspect Spray Paint</p> <p>Wrap in plastic bag to protect from scratches</p>										
15.0	D3595063570	RUBBER CUSHION								
<p>Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)</p> <p>Rubber Cushion</p> <p>Batch: _____</p>										
16.0	D2856600	Abrasion Strip								
<p>Comment: Qty.: 1.7640 f(s)/Unit Total : 1.7640 f(s)</p> <p>Pick: _____</p> <table><thead><tr><th>Qty</th><th>Part number</th><th>Description</th><th>Batch</th></tr></thead><tbody><tr><td>2</td><td>D2856-600(Cut to 10.090")</td><td>Abrasion Strip</td><td>_____</td></tr></tbody></table>			Qty	Part number	Description	Batch	2	D2856-600(Cut to 10.090")	Abrasion Strip	_____
Qty	Part number	Description	Batch							
2	D2856-600(Cut to 10.090")	Abrasion Strip	_____							
17.0	D28961	Support								
<p>Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)</p> <p>Pick: _____</p> <table><thead><tr><th>Qty</th><th>Part number</th><th>Description</th><th>Batch</th></tr></thead><tbody><tr><td>1</td><td>D2896-1</td><td>Support</td><td>_____</td></tr></tbody></table>			Qty	Part number	Description	Batch	1	D2896-1	Support	_____
Qty	Part number	Description	Batch							
1	D2896-1	Support	_____							
18.0	D31891	Chafing Shield								
<p>Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)</p> <p>Pick: _____</p> <table><thead><tr><th>Qty</th><th>Part number</th><th>Description</th><th>Batch</th></tr></thead><tbody><tr><td>2</td><td>D3189-1</td><td>Chafing Shield</td><td>_____</td></tr></tbody></table>			Qty	Part number	Description	Batch	2	D3189-1	Chafing Shield	_____
Qty	Part number	Description	Batch							
2	D3189-1	Chafing Shield	_____							

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Wednesday, 18/06/2008 8:59:12 AM
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Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 39908

Part Number: D412664203

Job Number:



Seq. #:	Machine Or Operation:	Description :
19.0	MS2192028	Clamp(per MIL-DTL-8783C)
Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s) Pick: Qty Part number Description Batch 4 MS21920-28 Clamp _____		
Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s) clamp(per MIL-DTL-8783C) batch:_____		
21.0	CROSSTUBES	CROSSTUBES RESOURCE 1
Comment: LANDING GEAR RESOURCE 1 Assemble as per Dwg D412-664-203 1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe 2-Install supports with magnobond as per QSI 015 Adhere for for 12 Hrs A/R 6398 Magnobond Batch:_____ Expiry Date:_____		
3-Install clamps as per Dwg D212-664-203 using installaition jig DT9024 with 0.010 thick brass shims on both chafing shield (D3189-1). Torque clamps to 80-100 in lb.		
22.0	QC5	INSPECT WORK TO CURRENT STEP
Comment: INSPECT WORK TO CURRENT STEP		
23.0	PACKAGING 1	PACKAGING RESOURCE #1
Comment: PACKAGING RESOURCE #1 Pick Packing Kit		

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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Drawing Name: HIGH AFT X-TUBE 412

Job Number: 39908

Part Number: D412664203

Job Number:



Seq. #:	Machine Or Operation:	Description :
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24.0	AN640A	Bolt
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Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: _____

25.0	AN641A	Bolt
------	--------	------



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Bolt

Batch: _____

26.0	AN960JD616	Washer
------	------------	--------



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)

Washer

Batch: _____

27.0	MS21042L6	Nut
------	-----------	-----



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)

Nut

Batch: _____

28.0	QC4	INSPECT 100% KITS FOR COMPLETENESS
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Comment: INSPECT 100% KITS FOR COMPLETENESS

29.0	PACKAGING 1	PACKAGING RESOURCE #1
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Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D412-664-203

*****Ensure tube is not packaged if curing time is less than 12 hrs, see step 27 for application time & date

Time & date of packaging: _____

Location: _____

PPP Rev: _____

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Job Number: 39908

Part Number: D412664203

Job Number:



Seq. #:	Machine Or Operation:	Description :
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30.0	QC21	FINAL INSPECTION/W/O RELEASE
------	------	------------------------------



Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



MF 08-07-10

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	39908
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: D		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

First Article Prototype

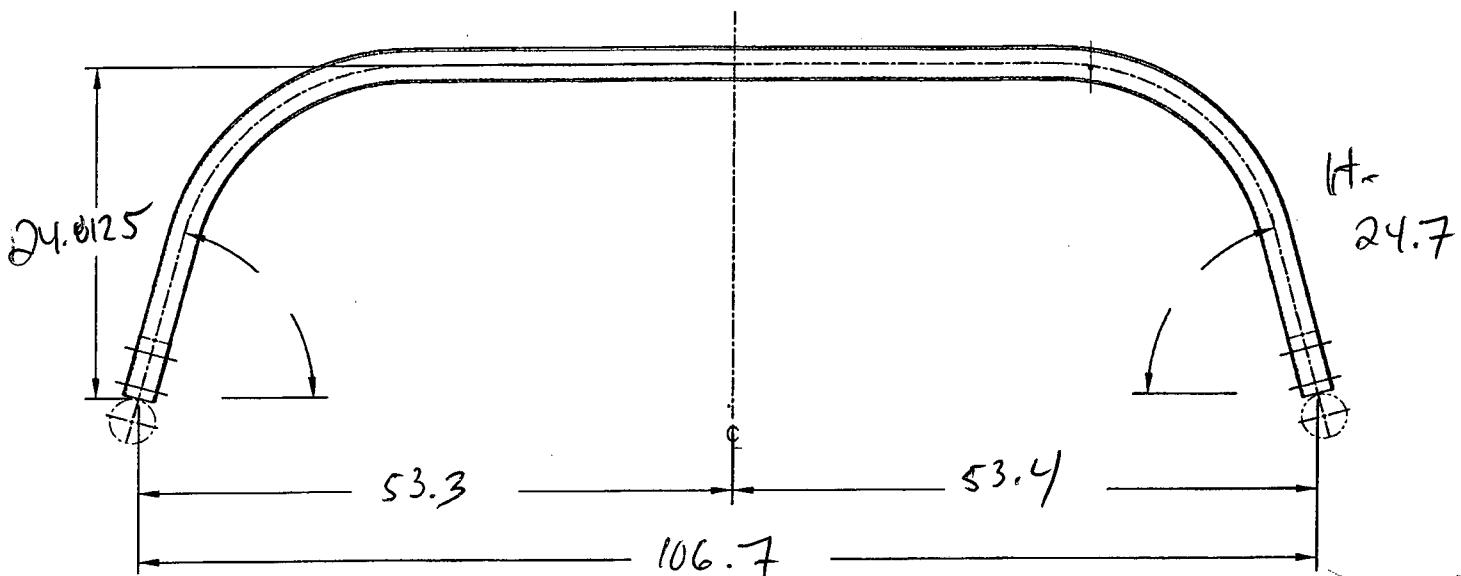
Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.684	+0.005/-0.000				
	2.748	+0.005/-0.000				
	2.884	+0.005/-0.000				
	3.019	+0.005/-0.000				
	3.163	+0.005/-0.000				
	3.308	+0.005/-0.000				
	3.429	+0.005/-0.000				
	2.990	+0.005/-0.000				
	2.618	+0.005/-0.000				
	0.200	+/-0.010				
	R0.063	+/-0.010				
	R0.500	+/-0.010				
	4.971	+/-0.030				
SIDE B	2.684	+0.005/-0.000				
	2.748	+0.005/-0.000				
	2.884	+0.005/-0.000				
	3.019	+0.005/-0.000				
	3.163	+0.005/-0.000				
	3.308	+0.005/-0.000				
	3.429	+0.005/-0.000				
	2.990	+0.005/-0.000				
	2.618	+0.005/-0.000				
	0.200	+/-0.010				
	R0.063	+/-0.010				
	R0.500	+/-0.010				
	4.971	+/-0.030				

Measured by:		Audited by:		Prototype Approval:	N/A
Date:		Date:		Date:	N/A

Rev	Date	Change	Revised by	Approved
A	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	07.05.08	Tolerance updated for dimension 4.971	KJ/JLM  	

DART AEROSPACE LTD	Work Order:	39908
Description: Crosstube High Aft (412)	Part Number:	D412-664-203
Inspection Dwg: D412-664-243	Rev: D	Page 1 of 1

Required Dimension	Min	Max
Height	24.24	24.50
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.70



Comments
Surf, too narrow & high

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	07.05.08	Dimensions updated per Dwg rev. D	KJ/JLM	

DART

DESIGN <i>PH</i>	DRAWN BY <i>PH</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>GP</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D412-664-243	REV. D SHEET 1 OF 3
DATE 07.03.09		TITLE CROSSTUBE ASSEMBLY (412 HI AFT)	SCALE NTS
A	01.10.17	NEW ISSUE	
B	05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	
C	06.10.27	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398 MS21920-32 WAS MS21920-30	
D	07.03.09	REMOVE D2732-058, CHANGE TO D3595-063-570	

RELEASED07.04.24 *[Signature]*

Qty	Part Number	Description
X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
1	D6009-129	CROSSTUBE
2	D3595-063-570	RUBBER CUSHION
1	D2896-1	SUPPORT
2	D2856-600-1009	ABRASION STRIP
4	MS21920-28	CLAMP
2	MS21920-30	CLAMP (OR MS21920-32)
2	D3189-1	CHAFING SHIELD
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

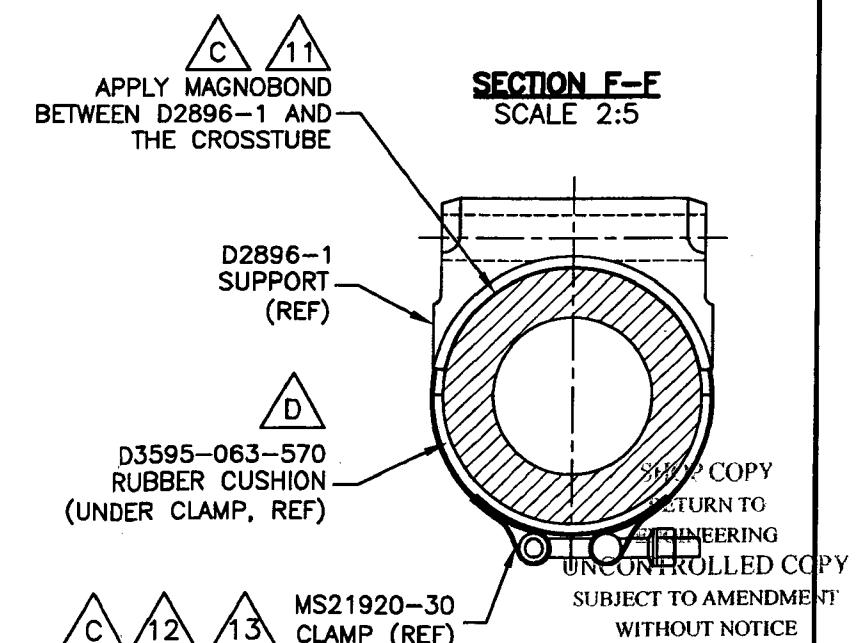
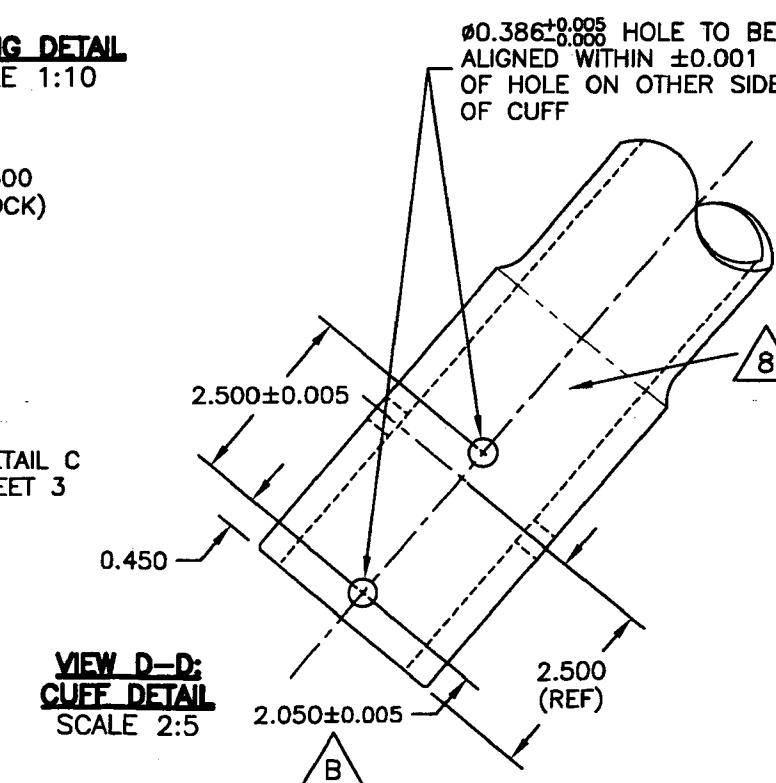
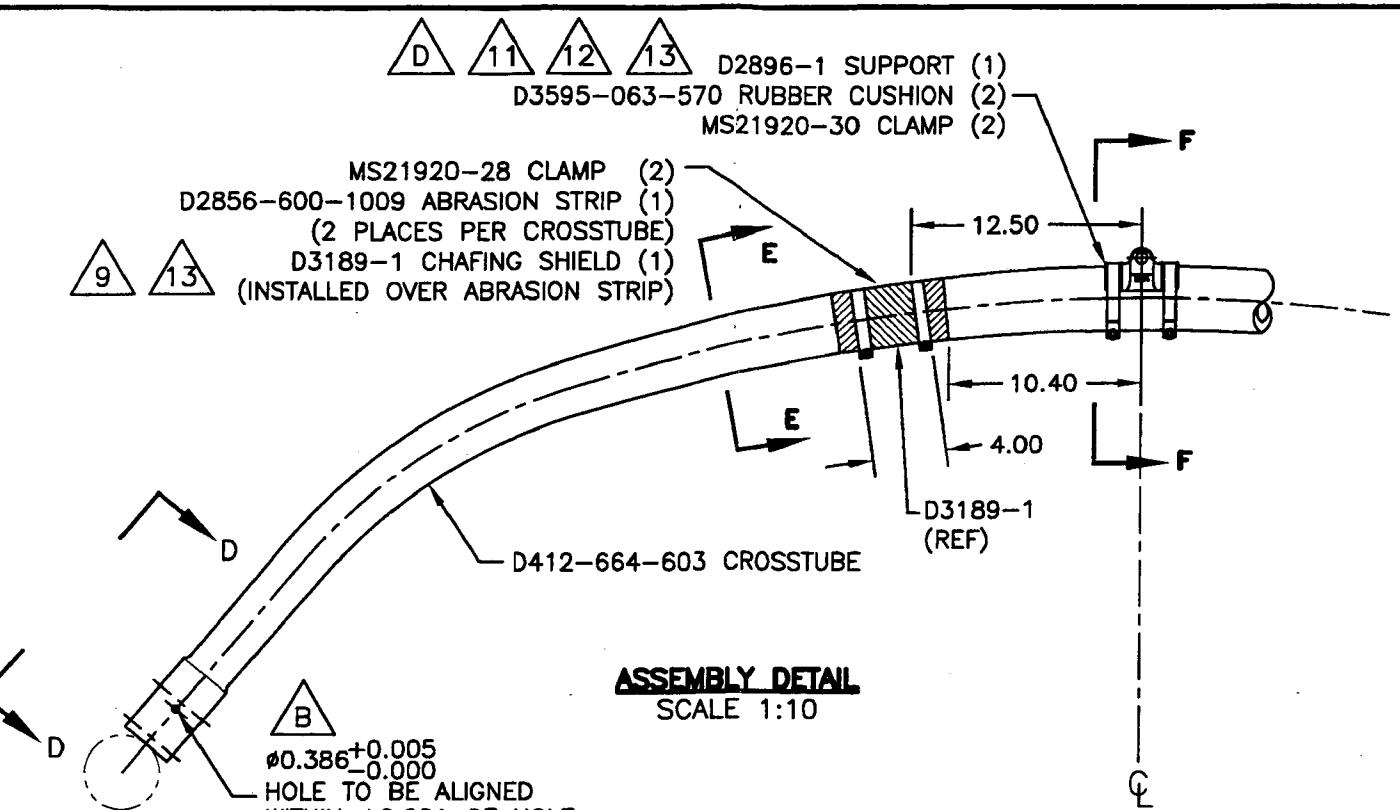
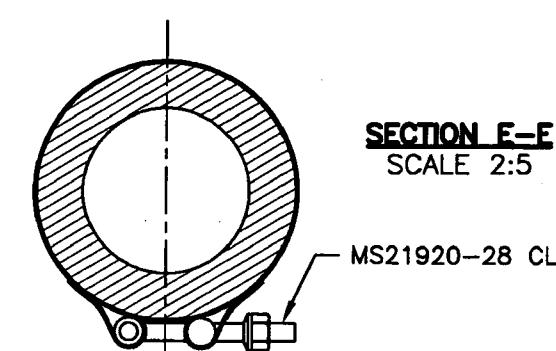
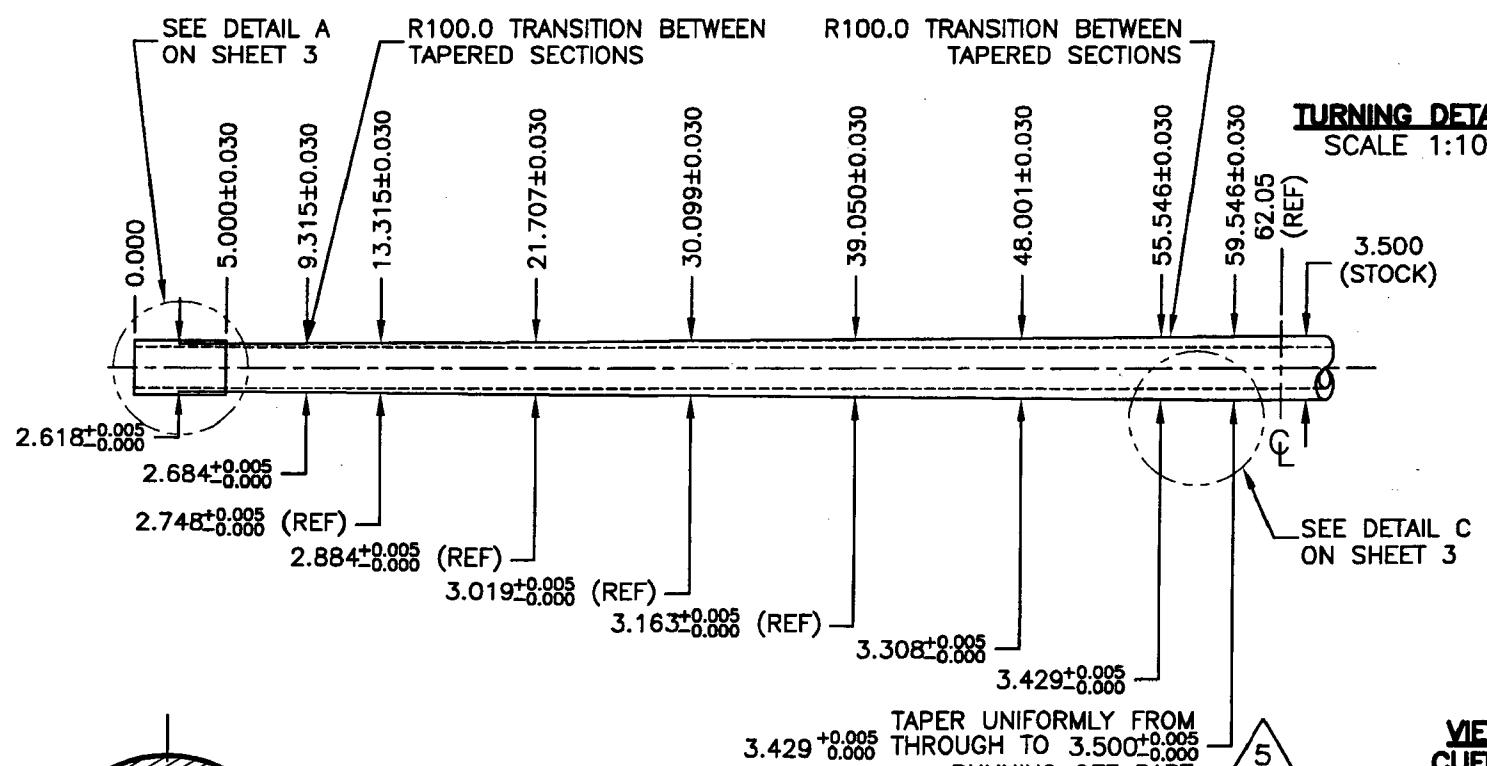
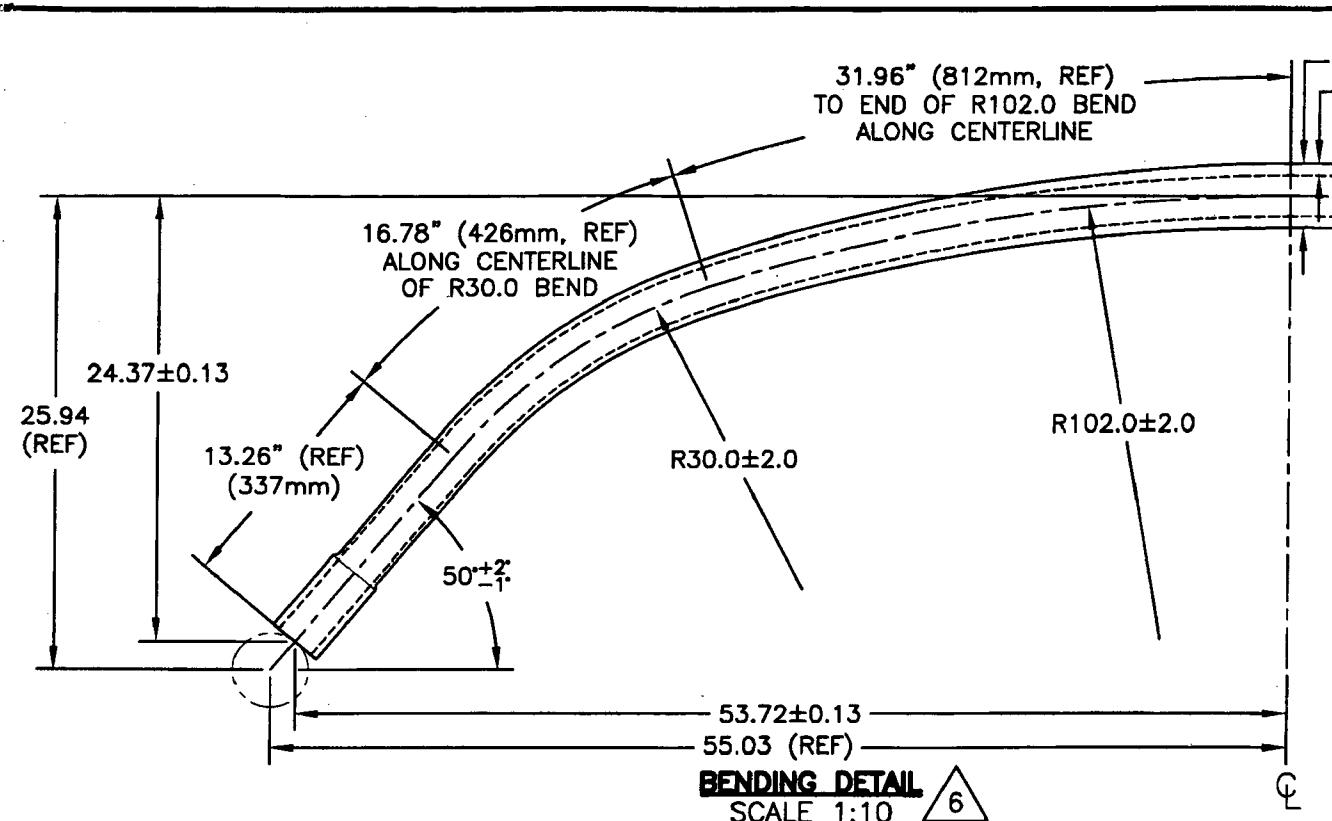
GENERAL NOTES:

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6009-129
FINISHED LENGTH = 124.09 ± 0.020
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDING OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. *39908*

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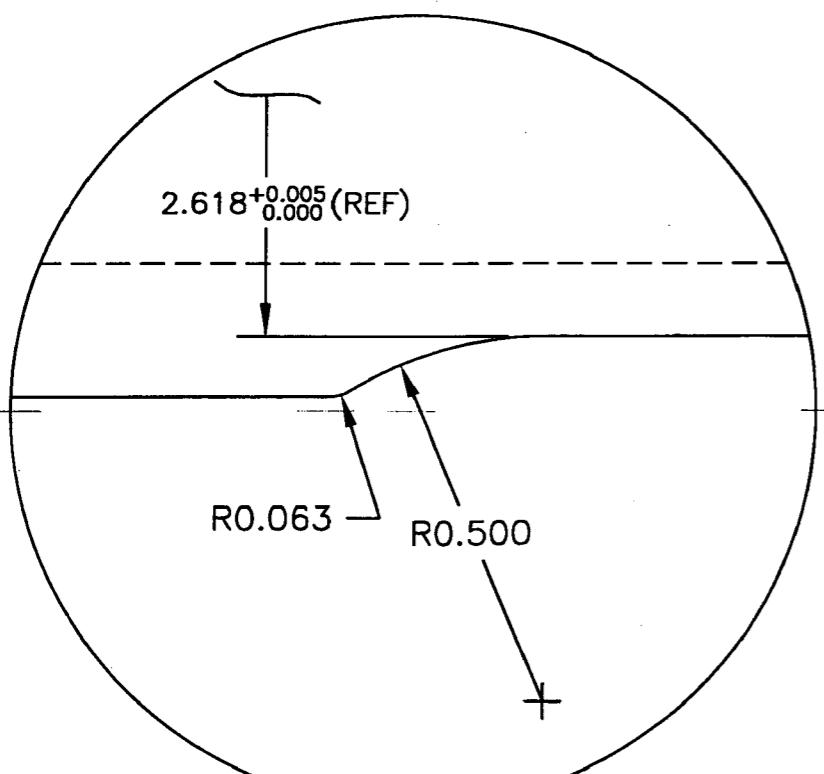
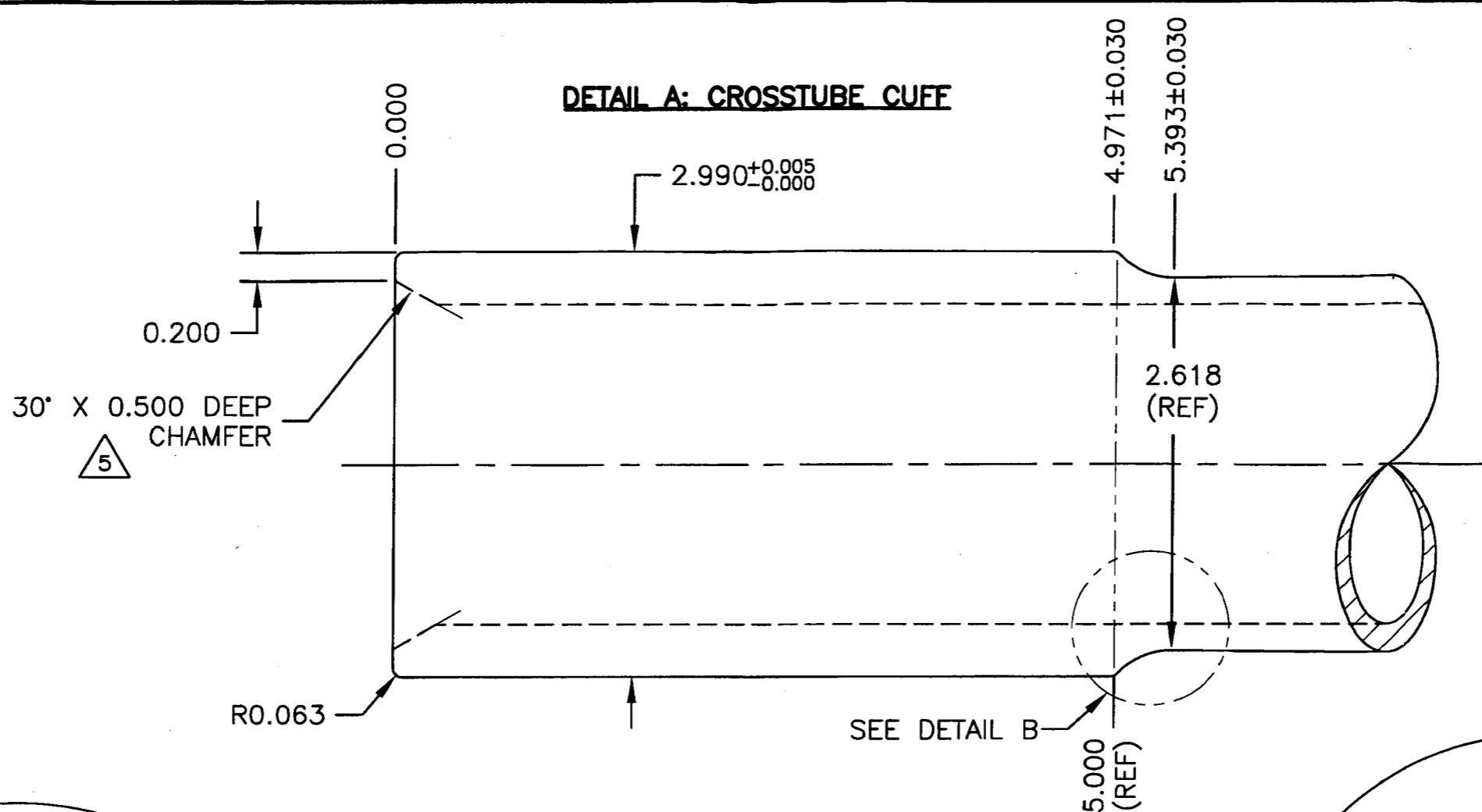
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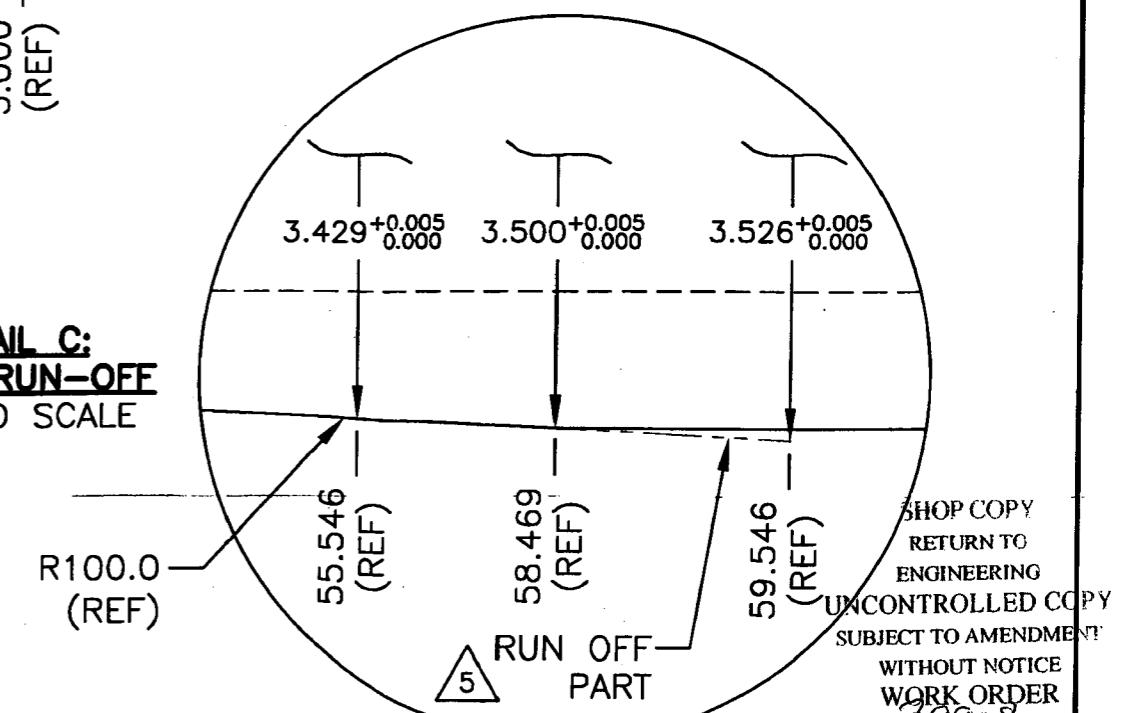
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DESIGN	DRAWN BY	DART	DART AEROSPACE LTD. HAWKSBURY, ONTARIO, CANADA
CHECKED	APPROVED		DRAWING NO.
07.03.09			D412-664-243
DATE	TITLE	SCALE	CROSSTUBE ASSEMBLY (412 HI AFT) 1:10

RELEASED
07.04.244P
PER ECN 889



**DETAIL C:
TAPER RUN-OFF**
NOT TO SCALE



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DESIGN	DRAWN BY	DART	DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
PH	PH		REV. D
CHECKED	APPROVED	DRAWING NO.	SHEET 3 OF 3
		D412-664-243	SCALE
DATE		TITLE	
07.03.09		CROSSTUBE ASSEMBLY (412 HI AFT)	1:1

